CHAPTER V
WATER QUALITY OBJECTIVES

SUMMARY

When finalized, this chapter will contain recommendations and supporting information for retaining existing objectives or for adopting proposed amendments. The purpose of this draft is to discuss the requirements that the objectives must meet and to present the alternative salinity and boron objectives that have been considered. It is anticipated that additional alternatives may be incorporated into the final draft of this chapter in response to comments received during the review process.

BACKGROUND

Water quality objectives are a key component of the water quality control program spelled out in the Board's Basin Plan. The water quality objectives are defined in the Water Code as "… the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

The Regional Board is reevaluating the objectives for boron and salinity in the Lower San Joaquin River (LSJR) for the following reasons:

- U.S. EPA did not approve the boron objectives for the LSJR adopted by the Board in 1988. U.S. EPA has not promulgated new objectives, and therefore the Board must do so.
- The State Water Resource Control Board (State Water Board) directed this Regional Board to set numerical objectives for salinity in the San Joaquin River upstream of Vernalis.
- Water Code section 12232 requires that state agencies do nothing to cause further significant degradation of the quality of water in the San Joaquin River between its confluence with the Merced River and the junction with Middle River.

The discussion in the remainder of this chapter is split into two sections, with the first addressing salinity and the second, boron. Each section provides background information on the level of the constituent that impacts sensitive beneficial uses. This is followed by a discussion of alternative objectives.

SALINITY

Definition

Salinity is the dissolved mineral concentration in water. The following table lists the major cations and anions that make up the salinity in the LSJR and their concentrations at two points in the river.

Table V-1

Average General Mineral Concentrations in the LSJR at Hills Ferry Road and at Airport Way, October 1995 - June 1998

		Airport Way (mg/L)	**Hills Ferry Road** (mg/L)
Cations			
Calcium	Ca	23	55
Magnesium	Mg	11	28
Sodium	Na	22	73
Potassium	K	2.7	4.6
Anions			
Bicarbonate	HCO_3	57	101
Sulfate	SO_4	62	224
Chloride	Cl	53	157

The salinity level in water is measured as total dissolved solids (TDS) or electrical conductivity (EC). TDS is measured by evaporating a known volume of water and weighing the remaining salts. It is reported in terms of weight of salt per volume of water, such as milligrams per liter (mg/L). EC (which is also referred to as specific conductance) measures the transmission of electricity through water and is reported in units of micromhos/cm. EC readings increase as salt levels increase.

There is a close relationship between TDS and EC. TDS (in mg/L) to EC (in micromhos/cm) ratios for the Lower San Joaquin River from Lander Avenue to Vernalis range from 0.590 to 0.686 (SWRCB, 1987) and 0.65 is typically used as the multiplier to convert from EC to TDS. .

Salinity Impact Levels

A literature review was conducted to provide a scientific basis for the setting salinity objectives. The results are presented in a draft staff technical report entitled *Salinity: A Literature Summary for Developing Water Quality Objective* (Davis, 2000a). Table V-2 summarizes the levels of salinity (EC or TDS) that affect beneficial uses. The information in the table is not specific to the conditions in the LSJR basin, and local factors such as water chemistry must be considered when using the information presented. The most sensitive beneficial uses are human drinking water, irrigated agriculture, and industrial uses. Other beneficial uses, such as fish and aquatic life, waterfowl, poultry, and livestock are more tolerant to salinity.

The August 1987 State Water Board Order No. 85-1 Technical Committee Report titled *Regulation of Agricultural Drainage to the San Joaquin River* presents an evaluation of water quality issues specific to the LSJR. It recommends a criterion of 700 micromhos/cm. to fully protect irrigated agriculture and indicates that salinity at or below this level should protect other beneficial uses, such as stock watering, fish, and wildlife. The criterion was intended to fully protect all crops on all soil types in the LSJR basin and the southern Delta, if adequate drainage is provided. The report states that an EC above 3,000 micromhos/cm is generally too high to support irrigated agriculture.

Irrigated Agriculture

Maas (1990) reports that crop tolerance to salt depends on the type and frequency of irrigation with saline water. The extent of crop damage varied depending on whether a drip, furrow, or sprinkler irrigation system was used. He states that climate influences plant response to salinity more than any other factor. Studies on several crops grown at high temperatures and low relative humidity showed decreased yields associated with highly saline waters. Young plant roots of emerging plants are exposed to greater stress from salts than the roots of more mature plants. Certain ions in highly saline water can cause damage from sprinkler irrigation. Leaf burn caused by sodium and chloride absorption may occur when evaporation is high (California Fertilizer Association, 1995).

As opposed to acutely toxic chemicals, the problem with saline water is the build up of salts in the soil profile over a period of time. Yield reduction occurs when salts accumulate in the root zone of the crop to such an extent that the crop, through a reversed osmotic potential, is no longer able to extract sufficient water from the salty soil solution, resulting in water stress. If water uptake is appreciably reduced, the crop plant slows its rate of growth resulting reduction in crop yield. Symptoms of salt toxicity are similar to those for plants under drought conditions, such as wilting, or a darker bluish-green leaf color, and occasionally thicker waxier leaves (Ayers and Westcot (1985). Increasing the amount of leaching with rain or better quality irrigation water can reduce the effects of soil salinity (California Fertilizer Association, 1995). Leaching reduces the average salt concentration in the soil root zone.

Table V-3 displays the effects of increasing irrigation water salinity on crop yields. For example, beans have a predicted full yield at 700 micromhos/cm, 50 percent crop yield at 2,400 micromhos/cm, and no theoretical yield at 4,200 micromhos/cm as EC in irrigation water.

Crop tolerance in the field can differ from the lab results presented in the table as a result of variations in soil conditions, cultural practices, climate, and other factors. Crop management techniques, soil leaching with low-salt waters, and dilution with rainfall can lessen the damage to crops caused by salinity. Most plants are more salt tolerant during germination, but become more sensitive to salts after germination during stages of emergence and early seedling growth.

Table V-3 Yield Potential of Selected LSJR Crops as Influenced by Irrigation Water Supply Salinity (adapted from Ayers and Westcot, 1985)

	Percentage Yield Potential				
Crop	100%	90%	75%	50%	0%
Sensitive	**EC in micromhos/cm**				
Beans	700	1,000	1,500	2,400	4,200
Almonds	1,000	1,400	1,900	2,800	4,500
Apricots	1,100	1,300	1,800	2,500	3,800
Moderately Sensitive	**EC in micromhos/cm**				
Alfalfa	1,300	2,200	3,600	5,900	10,000
Tomatoes	1,700	2,300	3,400	5,000	8,400
Moderately Tolerant	**EC in micromhos/cm**				
Wheat	4,000	4,900	6,300	8,700	13,000
Tolerant	**EC in micromhos/cm**				
Cotton	5,100	6,400	8,400	12,000	18,000
Barley	5,300	6,700	8,700	12,000	19,000

Municipal and Domestic Water Supplies

US EPA (1976; 1986) states that excess dissolved solids in drinking water are objectionable because of possible physiological effects, unpalatable mineral tastes, and higher costs from corrosion to pipes. Sodium sulfate can produce laxative effects and sodium is thought to increase risk from heart disease. McKee and Wolf, 1963, indicates that the salt concentration of good, palatable water should not exceed 500 mg/L and this concentration has subsequently been adopted as both federal and state secondary maximum contaminant levels for salt. However, water having higher concentrations could be consumed without harmful physiological effects and may be a source of necessary minerals. Waters containing 5,000 mg/L or more of dissolved solids are reported to be bitter and act as bladder and intestinal irritants.

As indicated below in the discussion of alternative objectives, the Department of Health Services has established secondary Maximum Contaminant Levels for salinity in drinking water supplies.

Industrial

According to McKee and Wolf (1963), dissolved solids in industrial water supplies can result in foaming inside boilers and interfere with clearness, color, or taste of many finished products. Elevated concentrations of salts also can accelerate corrosion. Concentrations from 50 to 3,000 mg/L dissolved solids have been recommended for waters used in specific industrial processes.

Industrial process supply is a designated beneficial use for the LSJR, but no existing uses are known.

TABLE V-2 Salinity Levels that Cause Impacts to Uses

USE	EC (micromhos/cm)	TDS (mg/L)	REFERENCE
Municipal Usage			USEPA, 1976,1986
Excellent	491-611*	319-397	
Good	1,012-1,161*	658-755	
Unacceptable	1,974-2,051*	1,283-1,333	
Drinking Water			
Federal Drinking Water Secondary MCL		500	USEPA, 1976,1986
California Drinking Water Secondary MCL			CCR Title 22
Recommended	900	500	
Upper Level	1,600	1,000	
SWRCB Sources of Drinking Water	5,000	3,000	Marshack, 1998
Fish and Other Aquatic Life			
Squawfish, Chub and Bonytail (avoided water with these concentrations)	6,770-10,153*	4,400-6,600	Pimental and Bulkley,1983
Water Flea (*D. magna*) (100% mortality)	15,385-17,690*	10,000-11,500	Dwyer, et al., 1992
Chinook Salmon (survival significantly reduced)	18,500-27,700*	12,000-18,000	Saike, et al., 1992
Industrial			
Limiting Concentrations	75-4,615*	50-3,000	McKee & Wolf, 1963
Irrigated Agriculture			Maas, 1990; SJVDIP, 1999
Sensitive Crops	0-1,067	0-693*	
Moderately Sensitive Crops	1,067-2,133	693-1,36*	
Moderately Tolerant Crops	2,133-4,200	1,386-2,730*	
Tolerant Crops	4,200-6,800	2,730-4,420*	
Unacceptable for crops	>6,800	>4,420*	

TABLE V-2 Salinity Levels that Cause Impacts to Uses

USE	EC (micromhos/cm)	TDS (mg/L)	REFERENCE
Poultry and Livestock Drinking Water			
Chicken, swine, cattle & sheep (survival)	23,075*	15,000	USEPA, 1973
Various effects on animals (injurious, safe upper limit or harmful)	4,400-28,615	2,860-18,600	McKee & Wolf, 1963
Waterfowl			
Mallard duckling			SJVDP, 1990
Molt delay	4,615*	3,000	
Growth reduced	7,720	5,020*	

* Calculated EC and TDS were based on a TDS/EC ratio of 0.65 unless values were given in the literature

ALTERNATIVE SALINITY OBJECTIVES

Three alternative approaches to setting numeric salinity objectives have been evaluated. Under Alternative 1 (the No Action Alternative), no change in objectives would take place. Alternative 2 would set objectives at concentrations that fully protect beneficial uses, while Alternative 3 would set an objective for the river at the maximum concentration allowed by the State Water Board at the intakes to the Delta-Mendota Canal and the California Aqueduct. These alternatives are discussed below and summarized in **Table ---.**

Additional alternatives may be developed as the result of public comments. With justification, the Board can set objectives that vary by location along the river and by the time of year.

Alternative 1 – No Action Alternative

The Basin Plan contains both narrative and numeric water quality objectives that apply to salinity levels from Mendota Dam to Vernalis. Both are found in the "Chemical Constituents" section of the Basin Plan's Water Quality Objectives chapter.

The narrative objective reads: "Waters shall not contain chemical constituents in concentrations that affect beneficial uses."

The numeric objective is "At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22, of the California Environmental Health Code of Regulations, which are incorporated by reference into this plan: Table 64449-B (Secondary Maximum Contaminant Levels – Ranges) of Section 64449." This table reads, in part:

Table 6449-B[1] Secondary Maximum Contaminant Levels – Ranges

[1] Title 22 also contains the following information:
"For the constituents shown in Table 64449-B, no fixed consumer acceptance contaminant level has been established.

(1) Constituent concentrations lower than the Recommended contaminant level are desirable for a higher degree of consumer acceptance.
(2) Constituent concentrations ranging to the Upper contaminant level are acceptable if it is neither reasonable nor feasible to provide more suitable waters.
(3) Constituent concentrations ranging to the Short Term contaminant level are acceptable only for existing systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources."

Constituent, Units	*Maximum Contaminant Level Ranges*		
	Recommended	*Upper*	*Short Term*
Total Dissolved Solids, mg/L or	500	1,000	1,500
Specific Conductance, micromhos/cm	900	1,600	2,200

In addition to the salinity objectives set by the Regional Board, the State Water Board set the following objectives for the San Joaquin River at Vernalis in the 1995 Bay-Delta Plan:

Location	Dates	30-day Running Average of Daily Mean Electrical Conductivity (micromhos/cm)
San Joaquin River at Airport Way Bridge, Vernalis	1 April-31 August 1 Sept. – 31 March	700 1,000

The Regional Board cannot modify the State Water Board objective.

Alternative 2 – Full Protection of Beneficial Uses

Alternative 2 would set numeric objectives that are expected to fully protect all beneficial uses. These objectives would apply from Mendota Dam to Vernalis. During the summer months (1 April – 31 August), the most sensitive use is irrigated agriculture. Some crops grown in the basin, including beans, can be impacted by salinity levels as low as 700 micromhos /cm during this time of the year. During the winter months, the most sensitive use is drinking water supply. As noted above, the secondary MCL recommends that concentrations in municipal supplies not exceed 900 micromhos /cm. Based on existing objectives set by the State Water Board (see Alternative 3), reasonable protection of these uses would be achieved by setting these levels as the maximum monthly average of the mean daily electrical conductivity.

Both the Regional Board's existing narrative objective, and the State Water Board's Vernalis objective, as discussed in Alternative 1, would not be changed and would apply under Alternative 2.

Alternative 3 – Delta Export Level

Alternative 3 would set a maximum monthly average of mean daily electrical conductivity of 1,000 micromhos/cm for the reach of the river from Mendota Dam to Vernalis. This is equivalent to the objective set by the State Water Board for Delta waters at the intakes to the California Aqueduct and the Delta-Mendota Canal (DMC).

Both the State and Federal canals supply irrigation, municipal, wetland and aquatic habitat water for extensive areas south of the Delta, including portions of the LSJR basin. This objective has been adopted by the State Water Board and approved by U.S. EPA and has thus been determined to provide reasonable protection of these beneficial uses.

The existing narrative objective and the State Water Board Vernalis objective, as discussed in Alternative 1, would apply under Alternative 3.

Discussion

Despite the existence of the objectives listed under Alternative 1, above, the State Water Board has directed the Regional Board to promptly adopt salinity objectives and a program of implementation for the main stem of the San Joaquin River upstream of Vernalis (Water Rights Decision 1641). Since the secondary MCLs for salinity are actually a range of numbers, it would clarify the Board's intent if specific numerical objectives were set.

The Board could fully protect all beneficial uses through the use of narrative objectives, but the salinity levels necessary to meet the narrative objective would have to be determined on a case-by-case basis, such as through waste discharge requirements.

In setting objectives, Water Code Section 13244 requires the Board to consider the following factors:

- Past, present, and probable future beneficial uses;
- Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;
- Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
- Economic considerations;
- The need for developing housing within the region; and
- The need to recycle and use recycled water.

State and Federal antidegradation policies, federal requirements and other factors must also be considered when setting the objectives. The alternative objectives listed above are discussed here relative to the factors that should be considered.

<u>Past, Present and Probable Future Beneficial Uses</u>
The narrative objective, which is a component of all three alternatives, fully protects all beneficial uses. The numeric objectives in Alternatives 2 and 3 would both provide at least reasonable protection of all of the uses and clarify the intent of the Board with respect to the allowable levels of salinity.

<u>Environmental Characteristics of the Hydrographic Unit and Quality of Available Water</u>

As indicated in Chapter III, salinity levels in the LSJR frequently exceed the numerical levels required by Alternatives 1 through 3. During most of the irrigation season, the DMC is the only supply water for the stretch of the LSJR from Mendota Dam to Merced River and the water in this canal does not consistently meet the numerical limits in Alternatives 1-3.

The LSJR is a highly modified and managed system. The quantity and quality of water delivered at any point can change over time. The ability to meet any set of objectives will depend on how effective adjustments in management are in the future.

Water Quality Conditions That Could Reasonably be Achieved
Significant reductions in salt discharges will be needed to meet the objectives in Alternatives 1 through 3. Potential approaches for achieving these reductions are discussed in Chapter VI.

Economic Considerations
This section is under development.

Need for Developing Housing
As indicated in Chapter III, the population is the LSJR basin is growing. The implementation program will directly impact several municipalities, and it is expected that efforts to reduce salt discharges will increase the cost of waste treatment. This, however, is not expected to prevent the development of additional housing.

Need to Develop and Use Recycled Water
It is anticipated that the implementation program to control salinity will promote use of recycled water, regardless of which objective is set by the Board.

Sound Scientific Basis (federal requirement)
The numerical objectives in Alternatives 1 and 2 are based on the latest guidelines for protection of municipal and agricultural uses. Alternative 3 is based on a concentration the State Water Board and US EPA have recently found appropriate for protecting these uses following a process that includes evaluation of the latest scientific information.

Protects all Designated Uses (federal requirement)
All three alternatives include a narrative objective that protects all designated uses. If, on a case-by-case basis it is determined that the specified numerical objectives are not protective, the Board can specify numeric limits through waste discharge requirements.

Antidegradation Policies
Water quality objectives and other components of the Basin Plan must comply with antidegradation policies adopted by the State Water Board and U.S. EPA. The goal of both policies is to maintain high quality waters.

Under the state policy, if water quality is better than the applicable policies, changes are allowed only when:

- It is consistent with maximum benefit to the people of the State of California;
- Does not unreasonably affect present and anticipated beneficial uses, and
- Does not result in water quality worse than that prescribed in policies.

In general, compliance with the state policy (State Water Board Resolution No. 68-16), results in compliance with the federal policy, which was adopted in 1975.

If the Board plans on taking an action that will result in salinity levels in the river exceeding those at the time the antidegradation policies were adopted, it can only do so if specific findings are made to justify the change. For the state policy, the Board would have to find that the change is consistent with the maximum benefit to the people of the State of California. For the federal policy, the Board would have to find that the degradation is necessary to accommodate important economic or social development.

BORON

Definition

Boron is an element commonly found in soils of the western United States.

Boron Impact Levels

A Regional Board staff report titled *Boron: A Literature Summary for Developing Water Quality Objectives* (Davis, 2000b) reviews and summarizes information on the effects of boron on beneficial uses. Based on this review, the most sensitive beneficial uses (agriculture, aquatic life and municipal supplies) may be impacted by boron concentrations in the range of 0.5 to 2.0 mg/L. A summary of information from this report is presented in Table V-2 and the impacts of boron on the more sensitive uses is discussed below

Irrigated Agriculture

Boron toxicity in plants is characterized by leaf malformation (such as, leaf cupping in young grape leaves), and by thickened, curled, wilted, and chlorotic leaves (California Fertilizer Association, 1995; Maas, 1990). Some sensitive fruit crops, such as stone fruits, rather than exhibiting leaf injury when exposed to toxic levels developed twig dieback and gummosis. Some crops may exhibit leaf injury with reduced yields at low boron concentrations (Maas and Gratten, 1999). High levels of boron can cause soft or necrotic spots in fruit or tubers, reduced flowering or improper pollination, and death of terminal growth (California Fertilizer Association, 1995). On seriously affected trees, such as almonds and other tree crops, which do not show typical leaf symptoms, a gum or ooze from limbs or trunk is often noticeable (Ayers and Westcot (1985)).

In Table V- crops are grouped according to their tolerance to boron; the concentrations where plant damage occurs are shown in parentheses. In general, sensitive crops include citrus, stone fruits, and nut trees. More tolerant crops include cotton, tubers, cereals, grains, grasses and most vegetables. ECETOC (1997) stated that annual rainfall dilutes boron in the soil thereby reducing the sensitivity to boron in irrigation water, and Oster (1998) concluded if effective rainfall that reaches the root zone exceeds eight inches per year based on long-term averages, boron classifications could be increased by one level. Classification for tree and vine crops is based on leaf damage of young seedlings. Cropping experience in California also indicates that the classifications of citrus, avocados, and grapes may be less sensitive than indicated.

Table V- Relative Boron Tolerance of Selected Agricultural Crops

(Maas, 1990; Maas and Gratten, 1999)

Sensitive (0.5-0.75 mg/L)	**Sensitive (0.75-1.0 mg/L)**	**Moderately Sensitive (1.0 - 2.0 mg/L)**
Apricot Avocado Cherry Fig Grape Grapefruit Orange Peach Pecan Persimmon Plum Walnut	Artichoke, Jerusalem Bean, kidney Bean, Lima Bean, snap Lupine Peanut Strawberry Sunflower Sweet potato Wheat	Broccoli Carrot Cucumber Lettuce Pea Pepper, red Potato Radish
Mod. Tolerant (2.0-4.0 mg/L)	**Tolerant (4.0-6.0 mg/L)**	**Very Tolerant (6.0-15.0 mg/L)**
Artichoke Bluegrass, Kentucky Cabbage Cauliflower Clover, sweet Cowpea Maize/corn Muskmelon Mustard Oat Squash, scallop Turnip	Alfalfa Beet, red Garlic Parsley Sugar beet Tomato Vetch, purple	Asparagus Celery Cotton Onion Sorghum

Fish and Aquatic Life

- Birge and Black (1977) examined boron toxicity in the early life (embryo, alevin, post hatched, larval, or early fry) stages of rainbow trout, channel catfish, goldfish, leopard frog, and toad. Fetal malformations were found including dwarf bodies and malformations of the cranium, vertebral column, fins, nervous system, yolk sac, and abdomen. Saiki, *et al*., (1993) concluded from sampling boron in aquatic food chains in the LSJR watershed that concentrations of boron were not biomagnified in the aquatic food chain because concentrations were usually higher in filamentous algae and detritus than in invertebrates and fishes.

- Sub-lethal effects on aquatic life from boron in the literature exist but are limited. Perry and Suffet (1994) reviewed boron toxicity for a number of algae species as reported by other researchers. They reported that Bowen and Gauch (1966) observed a reduction in growth rate for the green algae at a boron concentration of 50 mg/L and a reduction in algae growth at a boron concentration of 100 mg/L. Another study by Maier and Knight (1991) found sub-lethal toxicity for water flea and benthic invertebrate midge when exposed to tetra borate. A 48-hour exposure to a boron concentration of 20 mg/L resulted in a significant decrease in midge larval growth rate. After summarizing toxicity data for amphibians, invertebrates, algae and other aquatic life, Butterwick, *et al*. (1989), stated that no evidence has been found that aquatic organisms bioaccumulate boron.

Municipal Supplies

Federal and state human drinking water criteria for boron have been based on a 1972 study of “testicular atrophy and spemotogenic (SIC?) arrest” on dogs and rats by Weir and Fisher. Using the dog results, US EPA published a 0.63 mg/L boron level in the Integrated Risk Information System (IRIS) as a reference dose for drinking water. This number was rounded down to 0.60 mg/L as the US EPA drinking water health advisory or suggested no-adverse-response level (SNARL) for toxicity other than cancer risk. The California State action level of 1.0 mg/L was based on a 1988 risk assessment document using the same data source, but the analysis was permformed on the rat toxicity data. These recommended levels are for drinking water supplies. No federal or state drinking water MCL has been established for boron.

In summary, the criteria for protecting the more sensitive agricultural, aquatic life and drinking water are closely grouped in the range of --- to ---. Drinking water is lowest, with a US EPA SNARL of 0.6 mg/L. Agriculture is next, with sensitive crops being impacted at levels above ---. Some species of aquatic life appear to need boron levels below --- to avoid being adversely impacted.

ALTERNATIVE BORON OBJECTIVES

Two alternative approaches to setting numeric boron objectives have been evaluated. Under Alternative 1 (the No Action Alternative), no change in objectives would take place. Alternative 2 would set the objective at a concentration that fully protects beneficial uses. These alternatives are discussed below and summarized in Table ---.

Alternative 1 – No Action Alternative

The Basin Plan contains both narrative and numeric water quality objectives that apply to boron in the LSJR. Both are found in the “Chemical Constituents” section of the Water Quality Objectives chapter.

The narrative objective reads: “Waters shall not contain chemical constituents in concentrations that affect beneficial uses.”

The numerical objectives are:

<u>*Maximum* Boron Concentrations for the San Joaquin River, Mouth of Merced River to Vernalis</u>
2.0 mg/L from 15 March through 15 September
2.6 mg/L from 16 September through 14 March
<u>Mean *Monthly* Boron Concentrations for the San Joaquin River, Mouth of Merced River to Vernalis</u>
0.8 mg/L from 15 March through 15 September
1.0 mg/L from 16 September through 14 March
1.3 mg/L for *Critical Water Year* throughout the year
<u>Boron Concentration in the San Joaquin River from Mouth of Merced River to Sack Dam,</u>
5.8 mg/L Maximum
2.0 mg/L Monthly Mean from 15 March through 15 September

The US EPA, Region 9 did not approve these boron objectives, but has not promulgated standards under the federal program.

Alternative 2 – Full Protection of Beneficial Uses

Alternative 2 would set a numeric objective that is expected to fully protect all beneficial uses. This objective would apply from Mendota Dam to Vernalis.

The most sensitive use appears to be drinking water supplies, where the US EPA SNARL is 0.6 mg/L. This concentration, expressed as a 4-day average, would be the objective under Alternative 2.

The existing narrative objective applying to all chemical constituents, as discussed in Alternative 1, would not be changed and would apply under Alternative 2.

Discussion

As indicated in the salinity portion of this chapter, the Board must consider a number of factors before adopting an objective. In the following sections, the alternative boron objectives are discussed relative to the factors that should be considered.

<u>Past, Present and Probable Future Beneficial Uses</u>
The numerical objectives in Alternative 1 are higher than concentrations that impact sensitive crops and aquatic organisms. They also exceed levels that are recommended for protection of drinking water supplies.

Alternative 2 would protect all beneficial uses.

Environmental Characteristics of the Hydrographic Unit and Quality of Available Water
Information on the environmental characteristics of the LSJR are presented in Chapter III. As indicated in that discussion, boron levels in the river frequently exceed the numerical levels required by Alternatives 1 and 2.

Water Quality Conditions That Could Reasonably be Achieved
Significant reductions in boron discharges will be needed to meet the objectives in Alternatives 1 and 2. Potential approaches for achieving these reductions are discussed in Chapter VI.

Economic Considerations
This section is under development.
Need for Developing Housing
As indicated in Chapter III, the population is the LSJR basin is growing. The implementation program will directly impact several municipalities, and it is expected that efforts to reduce boron discharges will increase the cost of waste treatment. This, however, is not expected to prevent the development of additional housing.

Need to Develop and Use Recycled Water
It is anticipated that the implementation program to control boron will promote use of recycled water, regardless of which objective is set by the Board.

Sound Scientific Basis (federal requirement)
The numerical objective in Alternative 2 is based on the current guidelines for protection of the beneficial uses. Alternative 1 (No Action Alternative), was adopted by the Board in 1988 and reflects Board consideration of the information available at that time.

Protects all Designated Uses (federal requirement)
Both alternatives include a narrative objective that protects all designated uses. If, on a case-by-case basis it is determined that the specified numerical objectives are not protective, the Board can specify numeric limits through waste discharge requirements.

Antidegradation

RECOMMENDATION

To be completed.

TABLE V-2. SUMMARY OF BORON CONCENTRATIONS THAT CAUSE ADVERSE IMPACTS

USE	BORON mg/l	REFERENCE
Crops		
Very Sensitive	<0.5	Mass, 1990
Sensitive	0.5-1.0	
Moderately Sensitive	1.0-2.0	
Moderately Tolerant	2.0-4.0	
Tolerant	4.0-6.0	
Very Tolerant	6.0-15.0	
Fish and Amphibians		
Rainbow Trout (embryo/alevin) LOEC	0.75-1.0	Black, *et al.*,1993; ECETOC, 1997
Chinook Salmon, (swim up, advanced stages) 96-hr., LC_{50}	>100	Hamilton & Buhl, 1990
Channel Catfish (embryo, fry), 9-day LC_{50}	22-155	Birge & Black, 1977
Amphibians (embryo, larva), 7.5 day, LC_{5O}	47-145	Birge & Black, 1977
Aquatic Birds		
Ducks Feeding on Evaporation Pond Plants	<8-12	Skorupa, 1998
Freshwater Plant		
Eurasia Watermill, 32 days 50% Inhibited in Root Growth	30	Stanley, 1974
Duckweed Toxicity, Growth and Photosynthesis Reduction	1 - 200	Frick, 1985; Nobel, 1981
Algae		
Green Algae (*Chlorella vulagaris*) Reduction in Growth	50	Bowen and Gauch, 1966
Invertebrates		
Water Flea (*Daphnia magna*) Reproductive Effects		
Two day LC_{50}	133 to 226	Lewis and Valentine, 1981;
21 day LC_{50}	52 and 53	Maier and Knight, 1991
Livestock Drinking Water		
Guidelines for Livestock Drinking Water	5	Ayers & Westcot, 1985
Maximum Allowable	5	NAS, 1980; Weeth et al., 1981;
Maximum Tolerated	40	Green & Weeth, 1977
Human Health		

Suggested No Adverse Response Levels (SNARL)	0.60	Marshack, 1998; US EPA (various dates)
USEPA IRIS Reference Dose	0.63	US EPA IRIS Database; Marshack, 1998
State Action Level	1.0	California DHS (Marshack, 1998)

Table V-3. Lower San Joaquin River Salinity Objectives By Alternative (micromhos/cm)

Alternative	Vernalis	Mouth of Merced R. to Mouth of Stanislaus River	Sack Dam to Mouth of Merced River	Mendota Dam to Sack Dam
1 No Action	Max. 30 day Running Average 1 Apr. -31 Aug. *700*[a] 1 Sept.- 31 Mar. *1,000*[a]	Year Around Secondary MCL for Drinking Water[d] Recommended **900**[b] Upper Level **1,600**[c]	Year Around Secondary MCL for Drinking Water[d] Recommended **900**[b] Upper Level **1,600**[c]	Year Around Secondary MCL for Drinking Water[d] Recommended **900**[b] Upper Level **1,600c**
2 Full Protection of Beneficial Uses	Max. 30 day Running Average 1 Apr. -31 Aug. ***700***[a] 1 Sept.- 31 Mar. ***1,000***[a]	Max. 30 day Running Average 1 Apr. -31 Aug. ***700***[a] 1 Sept.- 31 Mar. ***900***[b]	Max. 30 day Running Average 1 Apr. -31 Aug. ***700***[a] 1 Sept.- 31 Mar. ***900***[b]	Max. 30 day Running Average 1 Apr. -31 Aug. ***700***[a] 1 Sept.- 31 Mar. ***900***[b]
3 Delta Export	Max. 30 day Running Average 1 Apr. -31 Aug. ***700***[a] 1 Sept.- 31 Mar. ***1,000***[a]	Year Around **1,000**[e] -	Year Around **1,000**[e] -	Year Around **1,000**[e] -

Sources of Objectives:
a = 1995 SWRCB Bay Delta Plan @ Vernalis based on irrigated agriculture, 700 to protect beans and 1,000 for alfalfa.

b = drinking water secondary MCL, recommended level.

c = drinking water secondary MCL, upper limit .

d = Basin Plan reference to Title 22 CCR, Article 16, Section 64449.

e = May 1991 and following Bay Delta Plans at the CVP and SWP export pumps.

Table V-4. Lower San Joaquin River Boron Objectives By Alternative

	Boron (mg/L)		
Alternative	**Mouth of Merced R. to Vernalis**	**Sack Dam to Mouth of Merced R.**	**Mendota Dam to Sack Dam**
1 **No Action**	Maximum 15 March - 15 Sept. ***2.0*** [a] 15 Sept.- 14 March ***2.6*** [a] Monthly Mean 15 March - 15 Sept. ***0.8*** [a] 15 Sept.- 14 March ***1.0*** [a] Critical Year ***1.3*** [a]	Maximum 15 March - 15 Sept. ***5.8*** [a] - Monthly Mean 15 March - 15 Sept. ***2.0*** [a] -	None
2 **Full Protection of Beneficial Uses**	Year Around Four-Day Average ***0.6*** [b]	Year Around Four-Day Average ***0.6*** [b]	Year Around Four-Day Average ***0.6*** [b]

Sources of Objectives:
a = set by the 1988 Basin Plan Amendment.
b = US EPA SNARL drinking water level.

CHAPTER VI
PROGRAM OF IMPLEMENTATION

SUMMARY

The purpose of the implementation program is to specify the steps the Board will take to obtain compliance with objectives. Salinity and boron levels in the LSJR already exceed concentrations that impact the identified beneficial uses and therefore the Board's control program must involve reductions in the amount of these constituents that are discharged.

This program will apply to all surface water discharges (other than stormwater runoff) from the following areas of the LSJR: Grassland watershed, all of Madera, Merced and Stanislaus Counties and those portions of San Joaquin County that is in the watershed upstream of Vernalis.

The sources of salt and boron in the river fall into two categories: point source and nonpoint source. Point sources are regulated with NPDES permits, and the regulatory program has well-defined approaches for addressing discharges to water quality limited segments. The Board will continue to follow these approaches using existing staff. Nonpoint sources, primarily return flows from irrigated agriculture and wetland areas, contribute the majority of the controllable discharges of salt and boron. Existing programs by the Board and other agencies do not appear capable of obtaining compliance with the water quality objectives in the foreseeable future and therefore the Board must initiate a more focused effort to control the nonpoint source discharges of these constituents.

One of the primary purposes of the proposed Basin Plan amendment will be to spell out how the Board will seek to reduce the levels of salt and boron from nonpoint sources. If, after implementation of feasible control measures, it is determined that the objectives for the river cannot be met, the Board could reevaluate the beneficial uses that can be supported by the achievable water quality.

Nonpoint source pollution control is usually achieved through implementation of management practices that reduce discharges of the constituents of concern. No single set of salinity/boron control measures is appropriate for all areas within the LSJR. The characteristics of the supply waters, soils, crops and other factors that influence the ability to control discharges vary significantly throughout the area. To achieve the optimum control of discharges, the feasibility and effectiveness of various approaches must be evaluated at a local level.

At the same time, one of the more promising approaches for achieving compliance with the salinity objectives at Vernalis requires coordination on a basin-wide scale. This approach, referred to as real-time management, involves timing releases of saline discharges to coincide with periods when there is assimilative capacity in the river. A demonstration project is already in place, but it is limited to providing information on near-future flows and does not coordinate discharges.

The Regional Board, therefore, must establish a program that prompts the completion of the following tasks:

(1) Identification, at a local level, of the optimum feasible approaches for controlling salinity and boron.
(2) Development of a basin-wide real-time management program (assuming that it is identified by local groups as an approach that they would be willing to support).
(3) Development of a time schedule for implementing the control measures.
(4) Providing an incentive for implementing the control measures.
(5) Tracking progress to ensure that all dischargers contribute to the control effort.
(6) Taking regulatory and/or enforcement action, as necessary, to obtain implementation of feasible control measures.

This work could be accomplished through the Board's waste discharge requirement (WDR) waiver program. Through this process, the Board can:

(1) Specify which dischargers (if any) are not required to participate in the control effort. For example, if the discharge meets the objectives set for the river, the Board may not require anything more than verification of this fact through submittal of monitoring data.

(2) Specify waiver conditions that will allow dischargers to continue operation without receiving waste discharge requirements. Two waiver conditions described in the chapter involve (1) preparation and submittal of management programs for reducing salinity and boron discharges and (2) participation in a real-time management program.

(3) Specify the date by which reports of waste discharge must be received from parties that are not in the above two categories.

Details of the waiver program can be adopted by resolution and modified as necessary outside of the Basin Planning process. The Board already has a waiver policy for irrigation tailwater that would have to be modified to address salinity and boron, and a new waiver program would have to be developed for wetland return flows.

It is anticipated that the initial phase of the program will allow dischargers time to monitor discharges and evaluate which of the above categories they want to fall into.

Because of the scale of this effort, the Board will work with water agencies and watershed groups to the extent possible. Direct contact with individual landowners will only be necessary if a group does not represent that landowner or the landowner does not follow locally developed management practices.

Timetables are proposed to ensure progress. The first priority will be compliance with the existing State Board objectives at Vernalis.

Reducing the amount of salt that can enter the river will require land storage and disposal facilities. In order to protect groundwater at these sites, the facilities will be required to meet Title 27 requirements and operate under waste discharge requirements.

BACKGROUND

Water Code section 13242 requires that the Basin Plan contain a program of implementation for achieving water quality objectives which includes at least the following:

(a) A description of the nature of actions, which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private.
(b) A time schedule for the actions to be taken.
(c) A description of surveillance to be undertaken to determine compliance with objectives.

This chapter discusses various actions and time schedules the Board could use to obtain compliance with the salt and boron objectives for the LSJR and describes the recommended alternative in detail. Surveillance is discussed in Chapter VII.

As discussed in Chapter III, the salt and boron in the LSJR comes from a variety of sources:

(1) background
(2) groundwater
(3) agricultural irrigation return flows
(4) wetland irrigation return flows
(5) point source discharges

The following discussion of implementation options focuses on the most controllable nonpoint sources, which in this case are the irrigation return flows from agriculture and wetlands and the point source discharges. It is recognized that a portion of salt and boron entering the river via groundwater is controllable to some extent and this source could be addressed in the future. The focus of this evaluation, however, is on surface discharges.

It is important to note that the concentrations of salt and boron in the LSJR frequently exceed the applicable water quality objectives. Because of this, the initial phase of the implementation program will have to be a cleanup effort and this must be followed by a sustained water quality protection effort. As part of the cleanup effort, the federal Clean Water Act requires the preparation of a TMDL for constituents that exceed the objectives. Portions of this chapter provide information that must be submitted to the U.S. EPA to satisfy the requirements of the Clean Water Act.

The Current Implementation Program

The implementation chapter of the Basin Plan addresses a wide variety of pollutants and pollutant sources. Those portions of the chapter that apply to salt and/or boron have been placed into Appendix – for reference.

Given the new objectives and the need for developing a TMDL, an evaluation of ongoing efforts has been made along with an assessment of alternative approaches for improving the implementation program. The analysis, which is presented below, has been conducted separately for point source and nonpoint source dischargers.

Point Source Discharges

Point sources addressed in this section are discharges that are regulated under National Pollutant Discharge Elimination System (NPDES) permits. Point source discharges do not contribute a large part of the salt and boron load to the LSJR, but these loads are expected to increase as more people and additional industries locate in the LSJR basin. A list of existing permitted facilities is provided in Table 1.

NPDES permits for municipal dischargers generally contain the following requirement "The Discharger shall use the best practicable treatment or control technique currently available to limit mineralization to no more than a reasonable increment". As NPDES Permits are renewed for dischargers which have elevated effluent salinity or which discharge to receiving waters with salinity problems, the Dischargers are being required to conduct studies of salt sources within the collection systems and develop salinity reduction plans that may contain one or more of the following:

(1) Economic feasibility of potential salt and boron control options including source abatement, pretreatment processes and treatment options;
(2) Proposed actions to control salt and boron discharges;
(3) Proposed long term monitoring program;
(4) Timeline of future work; and
(5) Analyses of impact to ground and surface water quality.

The approach being considered for point source dischargers is to require, at a minimum, development of salinity and boron reduction plans by all parties with NPDES permits. The TMDL, once adopted, will specify the loads allocated to point source dischargers and may require reductions in salt and/or boron discharges.

Nonpoint Source Discharges

The nonpoint source discharges addressed in this section are irrigation return flows from agriculture and wetlands. These sources are described in more detail in Chapter III.

As part of the Basin Planning process, the Board must consider a range of alternative approaches for achieving compliance with the water quality objectives. A comparison of the alternatives is presented in Tables 2 to 4 at the end of this chapter. . The following discussion provides additional information on how the alternatives may be applied to control salinity and boron levels.

The discharges of salt and boron from irrigated agriculture and wetlands fall under the category of nonpoint source pollution. The State Board has adopted a *Nonpoint Source Management Plan*, which describes how the State addresses the discharge of pollutants from this category of sources. This plan gives the Regional Boards flexibility in all specific case decisions, but recommends an escalating effort consisting of three steps.

- voluntary
- regulatory-based encouragement
- regulatory control

In addition to the use of this three-tier approach, the State and Regional Boards have adopted the watershed approach. This process involves getting all parties (stakeholders) in a watershed to participate in solving water quality problems.

Voluntary Efforts

Voluntary efforts to meet water quality objectives consist of those steps taken by dischargers without the presence of Regional Board regulatory efforts. The Board is often involved in these efforts to provide technical assistance and to administer grants providing funding for some aspect of the project.

Voluntary efforts will typically begin when it is recognized that a water quality problem exists or there is at least a threat of a water quality issue in the watershed. If such efforts are organized and are judged to have a potential for achieving compliance, the Board could cite them as the implementation process in the Basin Plan. Despite widespread knowledge of a salinity problem, however, no voluntary effort with a potential for meeting objectives could be identified in the LSJR basin.

The existence of a water quality problem related to salt and boron is common knowledge.

- The LSJR is on the 303(d) list as an impaired water body due to salinity and boron levels.

- The State Water Board's numerical salinity objectives for the SJR at Vernalis has been exceeded on a regular basis.

- The salt and boron content of the SJR impact the water quality in the State Water Project and DMC, which in turn impacts millions of agricultural and urban water users.

- The challenges related to agricultural drainage in the San Joaquin and Tulare Lake Basins was documented in the Rainbow Report, prepared by San Joaquin Valley Drainage Program. Four state and four federal agencies[1] formed the core of this program, but the technical and advisory committees established by the program had a broad cross section of stakeholders, including local water agencies. Water quality issues related to discharges of agricultural drainage containing salt and boron are addressed in the September1990 report titled *A Management Plan For Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley*. Following release of this report, the agencies established the San Joaquin Valley Drainage Implementation Program that continues to function.

- The San Joaquin River Management Program was established in ---- and is designed to help improve communication and coordination among agencies that are involved in issues related to the San Joaquin River. This group addresses a wide variety of topics, including a real-time management program to manage salinity levels at Vernalis. This program uses a model of the river system to project when the river may be able to accept more salt without exceeding the Vernalis objective. This information is provided to parties that have signed a Memorandum of Understanding in the hopes that the timing of saline discharges can be altered to the extent necessary to minimize the violations of the objective. This project focuses on the salinity level at one point in the river and is not expected to help the situations upstream where less dilution flows are available from east side streams.

- CALFED has identified salt and selenium as key water quality issues related to Delta water quality (reference). An advisory group has been established to identify the best way to spend available funds and this may lead to efforts that benefit LSJR water quality. The funds available at this time, however, are limited and until specific projects are identified, the extent to which the funded efforts will impact the LSJR cannot be determined.

The common understanding of the problem has not led to a voluntary effort to correct the problem. Staff is unaware of any voluntary action that has progressed to the point where it could be expected to achieve compliance with the objectives.

[1] State Water Resources Control Board, etc

Two recent efforts have been initiated and may have a long-term impact on the salt/boron situation.

- Westlands Water District and the State Board are in discussions to prepare the environmental documents required by NEPA and CEQA for a project to manage subsurface drainage in the WWD area. This district is not in the LSJR basin, but the district has set up a joint powers agreement with other districts, which may participate in the effort. This investigation of salinity control options is expected to provide information that may assist at least portions of the LSJR basin.

- The California Farm Bureau Federation has prepared a document titled *An Overview of the California Farm Bureau Federation Nonpoint Source Initiative*, which describes an effort that this organization will make to help address nonpoint source pollution from agricultural lands.

The State Board's recent Water Rights Decision 1641, adopted 29 December 1999 and revised 15 March 2000 in accordance with Order WR 2000-02, is expected to result in additional efforts to meet the Vernalis objectives. Various water right permits held by the Bureau are now conditioned upon implementation of the water quality objectives for agricultural beneficial uses in the southern Delta, including the San Joaquin River at Vernalis. However, the order also states: "If, within five years, Licensee/Permittee has not developed a program under which it will consistently achieve the Vernalis objectives, Licensee/Permittee shall report to the Executive Director of the SWRCB all actions it has taken in attempting to meet the objectives, including drainage and management alternatives. The Executive Director of the SWRCB will evaluate the report and will decide whether further action should be taken by the SWRCB to ensure that the objectives are met." This indicates that it may take over five years to determine whether the actions taken by the Bureau will be effective.

Despite the numerous activities listed above, staff is unable to identify a specific effort or combination of efforts that are expected to result in compliance with the water quality objectives for salt and boron upstream of Vernalis. The Board could take more of a proactive effort to achieve compliance through voluntary steps by setting up a watershed-based effort to control salt and boron. The proactive effort could include promotion and participation in:

(1) real-time management
(2) efforts by water agencies to conduct analysis of salt/boron controls in conjunction with or following the lead of WWD.
(3) Local efforts initiated by the Farm Bureau.

Following the watershed approach, staff would primarily provide technical assistance, administer funding that may be available through the federal 319(h) program and other sources, and comment on proposed actions and timetables. The extent of progress made in reducing salt and boron levels in the river would be entirely dependent on the number and effectiveness of voluntary actions that can be initiated, and the conviction of the group to accomplish anything.

If this approach is used, it may take several years before it can be determined whether compliance will be achieved through this process.

Regulatory-based encouragement

Under the regulatory-based encouragement approach, the Board spells out specific steps that must be taken to avoid regulation. The most common approach is to adopt a conditional waiver of waste discharge requirements for a class of dischargers. Those dischargers that comply with the waiver conditions can continue to operate outside the formal regulatory process and the Board focuses it's regulatory efforts on operations that do not comply with waiver conditions.

In Resolution No. 82-036, the Board adopted waiver conditions for irrigation return flows. WDRs are waived under the following condition:

> *Operating to minimize sediment to meet Basin Plan turbidity objectives and to prevent concentrations of materials toxic to fish or wildlife.*

These waiver conditions do not address salt and boron and therefore, irrigation return flows can meet the waiver conditions and still contribute to the violations of salt and boron objectives in the LSJR.

To apply the regulatory-based encouragement approach to control salt and boron, the Board would have to establish a new set of waiver conditions that it expects dischargers to meet. These conditions, in turn, would have to be effective in meeting water quality objectives.

At this time, there is no single set of actions that can be taken by someone discharging waters with elevated salt and boron levels that would ensure that the objectives will be met. In fact, technical groups for the San Joaquin Valley Drainage Program, CALFED and other efforts investigating the salinity problem have identified a number of approaches that may be effective in reducing salt levels in the river. These are summarized in Attachment A and fall into the following categories.

-Water quantity
-Basin level efforts
-District level efforts
-Field and farm level efforts.

The Board has no jurisdiction over water rights, and therefore, cannot take steps to provide additional, high quality water to reduce the salt and boron concentrations. The only alternative is to limit the amount of salt and boron entering the river through controllable discharges to the extent needed to meet water quality objectives.

In order to maximize this type of control effort, the Board will have to work with:

(1) DWR and USBR on basin-scale efforts
(2) Local water agencies on district activities
(3) Farm managers on the field and farm activities

Experience with the rice pesticide control program in the Sacramento Basin and the Grassland Bypass Project in the Grassland Watershed of the LSJR Basin has shown that the local water agencies can serve as the critical link between the Board and local irrigators as well as take steps at the district level (water pricing, discharge policies, recycling) that significantly reduce the water quality impacts of the discharges from an area.

In summary, any program that is based on regulatory-based encouragement would have to involve individual dischargers as well as local, state and federal agencies.

Regulatory Action

Under the Porter-Cologne Water Quality Control Act, the Regional Board has the authority to regulate discharges of waste, including irrigation return flows and wetland discharges. This is typically done through the issuance of individual or general waste discharge requirements. Where necessary, the Board can also prohibit the discharge of waste (Water Code Section 13243). The Board also has the authority to require dischargers to prepare technical reports providing information related to the discharge and its impacts (Water Code Section 13267)

Waste discharge requirements can be issued to parties discharging wastes, including individuals, agencies such as water districts, or companies. They can be prepared to address a specific case, or a general permit can be written to deal with a class of dischargers (for example, the Board has a general permit that applies to milk cow dairies).

Waste discharge requirements can specify the volume of discharge and set concentration and load limits on the constituents discharged. They can also set receiving water limits, in other words, the allowable concentration of a pollutant in the receiving water downstream of the discharge.

Where discharge limits in WDRs cannot be met at the time of adoption, the Board also adopts a Cease and Desist Order that specifies steps that must be taken and a timeline that must be followed to bring the discharge into compliance.

At the present time, the only WDRs addressing irrigation returns flows in the LSJR basin apply to the Grassland Bypass Project, which discharges drainage from approximately 97,000 acres of farmland. These requirements were issued as part of the Board’s selenium control program, but require preparation of a long-term management plan addressing salt and boron.

Waste discharge requirements take a considerable amount of time to prepare, administer and enforce. If enforced, however, they are an effective tool for controlling water quality.

A prohibition of discharge can be applied to specific types of discharges in specific geographic areas when necessary to protect water quality. The Board has adopted the following prohibitions that apply to irrigation return flows:

(1) The discharge of irrigation return flows containing molinate, thiobencarb, carbofuran, malathion and methyl parathion is prohibited unless the discharger is following a management practice approved by the Board.
(2) The discharge of agricultural subsurface drainage from the Grassland watershed to the San Joaquin River or its tributaries from any on-farm subsurface drain, open drain, or similar drain system is prohibited, unless such discharge began prior to the effective date of this amendment (10 January 1997) or unless such discharge is governed by waste discharge requirements.
(3) The discharge of agricultural subsurface drainage water to Salt Slough and wetland water supply channels identified in Appendix 40 (of the Basin Plan) is prohibited after 10 January 1997, unless water quality objectives for selenium are being met.
(4) The discharge of agricultural subsurface drainage water to Mud Slough (north) and the San Joaquin River from Sack Dam to the mouth of the Merced River is prohibited after 1 October 2010, unless water quality objectives for selenium are being met. This prohibition may be reconsidered if public or private interests prevent the implementation of a separate conveyance facility for agricultural subsurface drainage to the San Joaquin River.
(5) The discharge of selenium from agricultural subsurface drainage systems in the Grassland watershed to the San Joaquin River is prohibited in amounts exceeding 8,000 lbs/year for all water year types beginning 10 January 1997.
(6) Activities that increase the discharge of poor quality agricultural subsurface drainage are prohibited.

Under Water Code section 13267, the Board has the authority to require the preparation and submittal of reports related to the discharge of waste. These reports can be required of any party discharging waste, regardless of whether or not they are operating with waste discharge requirements. This authority has commonly been used by the Board to obtain information from water agencies regarding the quality and management of irrigation return flows. For example, water agencies in the Grassland watershed prepared Drainage Operation Plans as part of the selenium control program adopted by the Board in 1988. This Water Code section also allows the Board to issue Monitoring and Reporting Orders as a way of evaluating the impacts of discharges.

PROPOSED OPTIONS

To achieve compliance with the water quality objectives, the Regional Board is going to have to take an active role in the control of salt and boron discharges. Each of the three tiers of involvement discussed above has advantages and disadvantages. Ideally, the Board could set up a program that sets clear objectives and timelines while minimizing the burdens associated with waste discharge requirements.

The following program was developed considering the nature of the discharges from irrigated agriculture and the wetland areas, the diversity of circumstances within the LSJR, and the authority and resources provided to the Board to address this situation. It consists of a combination of approaches that provide dischargers with as many options as possible while setting clear expectations and consequences if efforts are not made to meet the objectives for salt and boron.

The entire effort described below would be a new undertaking for the Board. Resources to conduct the program are expected to be limited and this, as well as other factors, was considered in preparing the timelines and types of activities required. The effort will be conducted at both the local and basin levels as described below.

The program will be conducted under the framework of the Board's authority to issue waste discharge requirements and conditional waivers of waste discharge requirements. The Board can adopt a waiver policy by resolution (outside the Basin Planning process), and this resolution can specify the following:

(1) Which dischargers have to be involved in the control effort.
(2) The waiver conditions that must be met to avoid waste discharge requirements.
(3) Deadlines for submitting reports of waste discharge for dischargers that do not meet waiver conditions.

Field/Farm/District/regional activities

To achieve the maximum control of salt and boron discharges, the Board needs the involvement of all parties managing irrigation water throughout the basin. Rather than set up a program that attempts to do this field by field, the Board will work with water agencies and encourage the development of regional efforts where the agencies share common circumstances. Since circumstances vary significantly throughout the LSJR watershed, local agencies should be given options on how they would participate in the salt/boron control effort. These options would be:

1. **Cease discharge of irrigation return flows**. By following this approach, the area would no longer discharge to surface water and would be able to opt out of the salinity/boron control program. Any change in management practices would have to be reviewed to determine whether they pose a threat to ground water quality.

2. **Operate under Waste Discharge Requirements**. Under this option, the Board would regulate the discharge with individual or general waste discharge requirements. The requirements would include load limits after TMDLs are established by the Board. It is anticipated that this would be a preferred approach if complying with the discharge limits is easier than conducting an evaluation and developing a local control plan as required by the next option.

3. **Develop a local salt/boron control plan**. Under this approach, the discharger would conduct a feasibility analysis to evaluate the best blend of approaches to minimize discharges of salt and boron. Following the completion of this analysis, a plan containing specific plans and a timeline would be submitted to the Regional Board for review and approval. The goal of the plan would be to reduce discharges to levels that comply with the TMDLs developed by the Board. Details of the information that may be required in such an analysis are contained in Attachment C.

4. **Participate in a real-time management program.** This option involves the identification or formation of an entity that would operate a real-time management program. This entity would be responsible for real-time forecasting and the allocation of loads among participating parties. The entity would also coordinate efforts to identify and implement salt and boron control efforts among participants with the goal of meeting the objectives set by the Board. Under this approach, the load limits allocated to this group of dischargers would vary depending on the assimilative capacity of the river. This entity would probably be the largest discharger of salt and boron and would be responsible for completion of any reports required by CEQA and would operate under WDRs.

Attachment B provides additional information on how the program involving the development of local management plans (Option 3, above) would be conducted. The effort would begin by allowing time for monitoring activities, so that local agencies could develop an understanding of the concentrations and loads of salt and boron that are being discharged. Selected dischargers may be required to conduct monitoring under Monitoring and Reporting Orders.

At the same time the local groups are conducting monitoring, the Regional Board will draft WDRs that would apply to the districts, should they select that option. These draft orders will be distributed for review and comment.

After reviewing the draft order, the districts will notify the Board as to whether they want to proceed with obtaining WDRs or with the development of management plans.

While some districts proceed with development of management plans, the Board will be finalizing and adopting WDRs for those areas that opted for the second alternative.

Upon submittal of a management plan, Board staff will provide initial review and comments. The district will have the option of making changes before the plan is distributed for public review and scheduled for consideration by the Board at a public meeting.

After reviewing the management plans, the Board can either approve them or require revisions and resubmittal. If, a district fails to obtain an approval within a reasonable time frame (1 year?), the Board will require submittal of a report of waste discharge and the WDRs will be prepared.

To ensure full involvement, all portions of the project area that discharge irrigation return flows will be required to have an approved management plan or WDRs by 2005 or cease discharging. A prohibition of discharge will go into effect at that time and will be enforced with Cease and Desist Orders.

Basin scale efforts

Real-time management would involve the coordinated release of saline discharges at times when there is assimilative capacity and retention of the wastewater at other times. This has the potential of increasing the allowable discharges, which in turn could result in lower costs for waste management. Under a Calfed-funded grant, the USBR, DWR and the Regional Board are operating a pilot real-time pilot project for informational purposes only and a number of other agencies are supporting the effort through a Memorandum of Understanding.

Salinity and boron levels in the LSJR could be managed at a basin scale if a real-time management program capable of tracking and scheduling discharges was put into place. The Regional Board could encourage such a program by indicating that the one entity that operates the real-time program will receive the allocation of all assimilative capacity over a base-line amount. The base-line amount would be the load the river can carry in drought years while still meeting objectives.

Establishing a real-time management program would take more time than the establishment of local management programs due to the number of parties that would be involved. Attachment D provides a list of steps and a possible timetable that would be involved.

COORDINATION WITH OTHER WATER QUALITY CONTROL EFFORTS

The Board is conducting or is developing control efforts that address a number of constituents contained in irrigation return flows. In addition to salt and boron, these include selenium, pesticides and nutrients.

Monitoring programs, WDRs and management plans developed as part of the salt and boron control effort may include or later be amended to address other constituents in the discharge.

Proposed actions taken to control salt and boron will be reviewed to evaluate their impacts on other water quality problems in the receiving waters.

GROUNDWATER PROTECTION

Efforts to reduce the discharge of salt and boron to the LSJR are expected to result in the development of new storage and disposal sites for drainage waters and salts. These new operations may pose a threat to groundwater and will have to be reviewed by the Board.

The Board already operates a program for protection of water quality at waste management units, with the regulations specified in Title 27 of the California Code of Regulations. The concentrations of waste and the local site conditions will determine the construction and management requirements at these sites.

Table 2

IMPLEMENTATION ACTIONS THAT COULD BE TAKEN BY THE REGIONAL BOARD

ACTION	DESCRIPTION OF ACTION
No action	Board adopts numerical objectives for salt and boron, but makes no changes to the implementation chapter of the Basin Plan.
Recognize existing programs as adequate	Board updates the implementation chapter by incorporating information regarding ongoing salt and boron control efforts and indicates that these efforts are expected to result in compliance with the objectives.
Work with wholesale water providers (DWR & USBR)	Board would work with the U.S. Bureau of Reclamation and California Department of Water Resources to seek compliance with the objectives through revised water management programs at the project level.
Encourage and participate in watershed efforts	Board would rely on watershed efforts to achieve compliance with the objectives. Staff effort would focus on encouraging and participating in watershed meetings. The watershed groups would set the goals and timeschedules and staff would primarily provide technical/information support for the group rather than a regulatory presence.
Require all major discharger groups to participate in the control effort.	Board would require that major dischargers operate under waste discharge requirements or at a minimum prepare and follow management plans approved by the Board.
Regulate all discharges	Board would issue waste discharge requirements to all point and significant nonpoint source dischargers.
Adopt prohibition of discharge	Board would adopt a prohibition of discharge and enforce this prohibition.

Table 3

PROS AND CONS OF POTENTIAL IMPLEMENTATION ACTIONS

ACTION	PROS	CONS
No action	This approach would require minimal effort on the part of the Board or dischargers.	The implementation plan has not resulted in compliance with existing water quality objectives for salt and boron. It is not expected to result in compliance with the new objectives.
Recognize existing programs as adequate	This approach would require minimal effort on the part of the Board. Dischargers would continue to take steps they have already committed to.	It is not anticipated that existing programs will result in compliance with the objectives.
Work with wholesale water providers (DWR & USBR)	This approach would allow the Board to focus on efforts made by key water management agencies.	USBR and DWR do not have much control over the discharge of drainage water.
Encourage and participate in watershed efforts	This approach is encouraged by the State Water Board strategic plan. Actions are based on consensus agreements.	Watershed efforts would have to be established and/or refocused to address salt and boron. The Board would have to rely primarily on volunteer efforts and would have little control on the actions taken or the timetables set. A TMDL implementation plan could not be developed at this time if this approach is taken because there is no assurance that any action at all would be taken by dischargers.

Table 3

PROS AND CONS OF POTENTIAL IMPLEMENTATION ACTIONS

ACTION	PROS	CONS
Require all major discharger groups to participate in the control effort.	The Board would establish and maintain close contacts with all dischargers and push for as much control of discharges as is technically and economically feasible. All dischargers would participate - not just those that want to join the watershed effort.	This would be a true regulatory approach requiring more resources for the Board to operate. Dischargers would also be required to participate in the control effort and in many cases, this will involve a considerable amount of resources.
Regulate all discharges	This approach would involve direct one-on-one regulation all dischargers. This would make it easier for the Board to set time schedules and take enforcement action as necessary to obtain the maximum achievable control of salt and boron discharges in the shortest amount of time.	This approach would take the most resources to operate.
Adopt prohibition of discharge	A conditional prohibition of discharge could be used to protect the river without issuing waste discharge requirements. It could be issued to different categories of dischargers or apply only when certain conditions exist.	There would be less contact between the Board and the dischargers. Staff would have to find violators and prepare enforcement actions as necessary to implement this program. The ability of dischargers to comply with the prohibition of discharge would have to be evaluated based on the terms of the prohibition.

Table 4

STAFF REQUIREMENTS AND ACTIVITIES FOR THE POTENTIAL IMPLEMENTATION ACTIONS

BOARD ACTION	RESOURCES NEEDED TO CONDUCT PROGRAM	STAFF ACTIVITIES
No action		Periodically monitor salt and boron levels in the river.
Recognize existing programs as adequate	Include real time work.	Maintain contact with existing programs and periodically monitor salt and boron levels in the river.
Work with wholesale water providers (DWR & USBR)		Work with DWR and USBR staff to obtain changes in project operation that would reduce salt and boron concentrations in the river.
Encourage and participate in watershed efforts		Work with stakeholders to establish watershed groups. Participate in meetings to identify actions and timetables. Monitoring would be conducted as part of the watershed effort.
Require all major discharger groups to participate in the control effort.		Update NPDES permits and/or monitoring programs. Prepare waste discharge requirements as necessary. Work with dischargers to obtain and review management plans. Prepare enforcement actions as necessary.
Regulate all discharges		Update existing NPDES permits and/or monitoring programs. Prepare waste discharge requirements for all other significant discharges.
Adopt prohibition of		Prepare orders enforcing

Table 4

STAFF REQUIREMENTS AND ACTIVITIES FOR THE POTENTIAL IMPLEMENTATION ACTIONS

BOARD ACTION	RESOURCES NEEDED TO CONDUCT PROGRAM	STAFF ACTIVITIES
discharge		prohibition of discharge, as necessary.

ATTACHMENT A

METHODS OF REDUCING SALINITY AND BORON IN THE LOWER SAN JOAQUIN RIVER (LSJR)

Salinity and Boron Basin Plan Amendment
California Regional Water Quality Control Board, Central Valley Region

I. LESS SALT INTO THE LSJR VALLEY

1. Improve Quality of Supply Water (Delta)

Improving the quality of water supplies in the Basin would result in lower salt loads in agricultural, wetland, and municipal discharges. There are several proposals for reducing salt levels in water pumped from the Delta. They include through-Delta conveyance, relocation of drainage from the Delta islands, and South Delta and Delta Region circulation barriers.

On the order of 600 thousand tons of salt per year are currently imported to the LSJR Basin via the Delta Mendota Canal (DMC). All of this salt is stored in soils and groundwater in the basin or discharged to the LSJR. A fifty percent reduction in EC in the DMC would result in reduced import of 300 thousand tons per year. Currently, annual salt load discharged from the basin is one million tons per year, so a 50 percent reduction in imported salt loads represents 30 percent of the total load currently being exported.

Status: CALFED and others are evaluating Delta alternatives that could improve the quality of water for water supplies.

II. MORE WATER TO LSJR

1. Increasing San Joaquin River Flows

Increasing instream flow in the LSJR would provide dilution and mixing options. Additional or existing on-stream or off-stream storage could be used to provide more instream flows. For example, more releases of water from Friant Dam and east side tributary reservoirs to the LSJR, and recirculation of Delta Mendota Canal water back to the LSJR via Newman wasteway or other channels could supplement flow and provide benefits to multiple LSJR beneficial uses.

Institutional factors, such as the Bay-Delta hearings, the Vernalis Adapted Management Plan, pending laws suits, and FERC rulings affect LSJR water flow. Climatic factors complicate management of the LSJR system and limit flow during dryer years.

Status: Flows in the LSJR continue to vary widely due to factors beyond the control of the Regional Board.

III. LESS SALT IN DRAIN WATER

1. Reduced Water Use (Water Conservation)

Water conservation management is the use of improved irrigation methods, such as sprinklers and drip irrigation.

This method reduces the volume of water that must be: imported into the basin; pumped from the LSJR; or pumped from groundwater. Reduction in imported salts can have a large long-term positive impact on water quality. Reduced water application rates will result in less mobilization of in situ salts and a reduction in the amount of imported salt. High conservation rates reduces the volume of water that moves below the root zone as deep percolation and can result in buildup of salts in soils, shallow groundwater, and/or deep groundwater.

Status: the magnitude of positive impact depends on how much water conservation is still feasible -- many areas have already reached high levels of conservation, applying water sufficient only to provide minimum leaching requirement. The magnitude of positive impact also depends what is done with conserved water. Methods that reduce subsurface flow should be more effective in reducing agricultural salts discharge to the LSJR than those that reduce surface drainage.

2. Drainage Recirculation (Tailwater Recovery)

Recirculation is collection and reuse of tailwater to irrigate crops at the field, water district or regional level.

This basic recirculation approach allows for more efficient use of water, particularly when used in conjunction with Water Conservation methods. Use of tailwater recovery systems to reduce or eliminate tailwater discharges may in some cases significantly reduce the flow and increase salt and boron concentrations in receiving waters, because such tailwater systems do not reduce tilewater, which typically is much higher in salts (including boron) than tail water.

Status: drainage recirculation on the farm and district level is commonly used in many parts of the valley. Discharge salt concentration will likely increase as tailwater is recirculated.

3. Sequential Reuse & Volume Reduction

Sequential reuse is the multiple use of irrigation water on progressively salt tolerant plants in order to concentrate and reduce volumes of saline water.

Particularly if combined with ponds and water treatment methods, this approach will help reduce instantaneous peak loads of salt to the LSJR. But unless combined with salt disposal, this method is only a short-term remedy for salt loading to the LSJR because salts are still imported to and generated within the basin. Without consideration of where salt goes in the system, this method can lead to long-term degradation (salinization) of soils and groundwater. Groundwater degradation, in turn, will lead to increased long-term salt loading to the LSJR.

Status: the current water quality regime in the LSJR is a de facto form of sequential reuse where agricultural discharges higher in the watershed become the supply water for more salt tolerant crops (by necessity) further downstream. A few projects using intensive sequential reuse exist on farms in the Tulare Lake and Grasslands Basins. Discharge salt concentration will likely increase as tailwater is reused.

4. Evaporation Ponds

Ponds would be used in this method to evapoconcentrate salts and reduce drainage water volumes.

This method would be most effective combined with initial reduction in volume and concentration of salts using drainage reduction, reuse, and volume reduction methods. Potential adverse impacts to groundwater and wildlife must be addressed. Suitability of use must be evaluated on a local level. Unless combined with salt disposal, this method is only a short-term remedy to salt loading to the LSJR.

Status: evaporation ponds are currently used in Tulare Basin, but are not commonly used in the LSJR Basin.

5. Water Treatment

Treatment methods, such as reverse osmosis and ion exchange, could be used to remove salt and boron as well as trace elements.

Salts removed through these methods would need to be salt disposed, used, or stored. Concentration of drainage water by reuse and separation tile and tail water will result in less volume to treat.

Status: water treatment systems are not currently in use except in experimental form to remove salt or boron from agricultural drainage in the LSJR basin. Disposal of wastes (brine) after treatment needs to be addressed.

6. Land Retirement

This method involves cessation of irrigation on soils overlying shallow ground water that is high in selenium, salts, and/or boron.

Land retirement must occur in conjunction with reduced water imports so positive impacts are not offset by expanded water use on other shallow groundwater areas that are high in boron and salts within the basin.

Status: the U.S. Department of Interior has a land retirement team authorized under CVPIA, and the San Joaquin Drainage Relief Act in California Water Code Section 14900 authorized a land retirement system administered through the Department of Water Resources. This program is on a willing seller basis. Under this program all irrigation activities are to cease except for limited land management purposes, which will not contribute to existing drainage problems.

7. Active Alternative Land Management

Crop selection and irrigation practices could be modified to reduce high salt and boron drainage discharges. For example, deep-rooted crops that have the ability to use the shallow groundwater could reduce the need for irrigation. This method is seen as an alternative to land retirement.

Status: Three Grasslands Basin water districts in conjunction with the U. S. Bureau of Reclamation and U.S. Agricultural Research Service have a prototype project. This project includes sequential reuse in one of the districts.

8. Reduce Municipal and Industrial Sources of Salts

Source control, additional treatment processes, or application of waste to land would reduce salt load from municipal and industrial sources.

Application of waste to land could contribute indirectly to LSJR salinity through ground water accretions to the LSJR sytem. Application of saline and high boron waste to land could result in increased salt loading to ground water resulting in degradation of aquifer water quality.

Status: the Regional Board and local entities have active urban and industrial storm water management and dairy enforcement programs, but deal with only a fraction of the potential sources of salts. Also in June 1999, the City of Livingston submitted a salinity source control program as required by the Regional Board's C&D order that includes modifying their sewer ordinance.

9. Reduce Other Non-Point Sources of Salts and Boron

Salt and boron loads to the Lower SJR Basin could be reduced from other non-point sources, such as from urban storm water runoff, fertilizers, and animal waste.

Salts applied to land as fertilizer and animal waste contribute to loads that reach the groundwater and river. Control can occur at both the point of use and where these salts are discharged.

Status: the Regional Board and local entities have an active urban and industrial storm water management and dairy enforcement programs.

10. Ground Water Management

Managing shallow groundwater in certain agricultural areas could help to reduce subsurface drainage. Pumping and using the groundwater, would lower the shallow water table and reduce subsurface drainage volumes and salts.

Pumped water must be disposed of or applied to crops. Hence, this method must be used in conjunction with methods that reduce or dispose of salts. This option would need to be part of a ground water management plan that would assure protection of deep ground water quality.

Status: this method has not been used even though it was recommend by the SJVDP.

IV. MORE SALT OUT

1. Salt Disposal/Out of Valley Transport

Salt disposal requires transport out of the valley, long-term valley disposal and/or use of residual salts as a commodity. Out-of-valley transport could involve construction of disposal or transportation facilities to convey salts and boron from the LSJR Basin (e.g. an out- of-valley drain). Regional Board policy encourages construction of facilities to convey agricultural drain water.

Status: no facilities are in place for long-term in-valley disposal or for transport of salt and boron out of the valley. Salt and boron that does not leave the valley via the SJR or in harvested crops is stored in the soil or groundwater.

V. REALTIME WATER MANGEMENT

1. Controlled Timing Of Discharges (Real-Time Water Management)

The LSJR has some capacity to assimilate salinity and boron discharges through coordination of releases from both saline and better quality water sources. Scheduling high salinity and boron discharges to coincide with higher flows from reservoirs including flood flows, and higher quality discharges could be used to help meet water quality objectives.

This method has the potential to reduce peak loads (and concentrations) in the LSJR so that water quality objectives are met more frequently. This method has the further advantage of managing salt loads so that more salt leaves the LSJR Basin when there is assimilative capacity in the river. Real time management is of little or no value for reaches of the river that have limited assimilative capacity (that is, areas upstream of east side dilution flows) unless additional flow is provided.

Status: a pilot real time management effort was completed in June 1997. A Memorandum of Understanding (MOU) to promote the practice of real time management has been signed by several agencies. CALFED has funded a real time management project for two years beginning in April 1999.

For further detail, see technical reports by the San Joaquin Valley Drainage Program, San Joaquin Valley Drainage Implementation Program, CALFED, and the University of California Drainage/Salinity Programs.

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ATTACHMENT B

DRAFT SALT/BORON IMPLEMENTATION PROGRAM FOR IRRIGATED AGRICULTURE AND WETLANDS IN THE LOWER SAN JOAQUIN RIVER BASIN

Line	Time months	REGIONAL BOARD ACTIONS	DISCHARGER ACTIONS		
			Track 1 Management Plan Option	**Track 2 WDR Option**	**Track 3 Cease Discharge Option**
1		Develop and obtain approval of Basin Plan amendment	Participate in Basin Planning process	Participate in Basin Planning process	Participate in Basin Planning process
2	18	1. Issue Monitoring and Reporting Program Orders to major dischargers 2. Draft Waste Discharge Requirements (WDRs) 3. Release draft boilerplateWDRs	Monitor discharges for flow, salt and boron	Monitor discharges for flow, salt and boron	Cease discharge of irrigation return flows by date specified in Basin Plan
3	2		1. Review draft WDRs 2. Notify Board of intent to prepare management plan for approval	1. Review draft WDRs 2. Notify Board of intent to operate under WDRs	
4	18		Prepare management plan containing: 1. Feasibility analysis of salt and boron control options 2. Economic analysis 3. Proposed actions 4. Proposed monitoring program	Submit Report of Waste Discharge	

Line	Time months	REGIONAL BOARD ACTIONS	DISCHARGER ACTIONS		
			Track 1 Management Plan Option	**Track 2 WDR Option**	**Track 3 Cease Discharge Option**
			5. Timeline		
5	12	1. Staff review and comment on management plans for Track 2 dischargers 2. Prepare WDRs (and Cease and Desist Orders if necessary) for Track 3 dischargers			
6	3		Respond to Board staff comments		
7	3	Hold Board meetings to consider Management Plans and WDRs	Participate in Board meetings	Participate in Board meetings	
8	6	Prepare WDRs/C&D Orders for dischargers that did not receive approval of Management Plans	1. If approval received, operate according to Management Plan 2. If approval not received, revise Management Plan or prepare Report of Waste Discharge	Operate pursuant to WDRs (and C&D Orders, if applicable)	
9	2	Board simultaneously consider revised Management Plans and WDRs/C&D Orders for Track 2 dischargers and	Participate in Board meeting		

Line	Time months	REGIONAL BOARD ACTIONS	DISCHARGER ACTIONS		
			Track 1 Management Plan Option	Track 2 WDR Option	Track 3 Cease Discharge Option
		decide which to approve			
10	6	Issue C&D Orders to dischargers without WDRs or approved management plans			
	Total: 70				

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ATTACHMENT C

LOCAL WATERSHED MANAGEMENT PLANS

One condition the Board could establish for obtaining a waiver could be the development of a "Local watershed management plan" as defined by Section 79078 of the Water Code. This plan does all of the following:

(1) Defines the geographical boundaries of the watershed.
(2) Describes the natural resource conditions within the watershed.
(3) Describes measurable characteristics for water quality improvements.
(4) Describes methods for achieving and sustaining water quality improvements.
(5) Identifies any person, organization, or public agency that is responsible for implementing the methods described in paragraph (4).
(6) Provides milestones for implementing the methods described in paragraph (4).
(7) Describes a monitoring program designed to measure the effectiveness of the methods described in paragraph (4).

While the above description is general in nature, the plans prepared for the salinity and boron control effort would have to focus on the control of these constituents.

ATTACHMENT D

DRAFT SALINITY/BORON IMPLEMENTATION PROCESS FOR ESTABLISHMENT OF A REAL-TIME MANAGEMENT PROGRAM

Steps	Timetable
The Regional Board establishes a policy that only one set of waste discharge requirements will be issued for real-time management. All other parties under WDRs will receive fixed load limits.	Part of Basin Plan Amendment
Dischargers are given time to monitor their discharges and evaluate whether they want to be involved in development of a real-time program.	1 year
The Regional Board develops an MOU that will be used to identify which parties will receive a waiver of WDRs pending development of the real-time management program	
Dischargers are given a specified time to commit to development of a real-time management program by signing the MOU	6 months
All participants in the MOU participate in the development of an organization, procedures for operating a real-time management program and the process that will be followed to identify and implement salt and boron control measures suitable for the participants.	1 year
Dischargers are given the option of joining the real-time management program, as established, or submitting a report of waste discharge.	3 months
The organization is established, prepares an environmental review as required by CEQA and submits a Report of Waste Discharge.	1 year
The Regional Board prepares waste discharge requirements for the real-time management operation.	6 months
The entity that conducts the real-time management program serves as the contact between the Regional Board and participating parties.	Ongoing